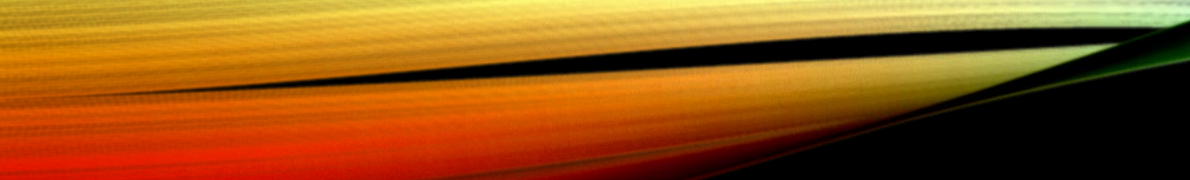




MAKING SENSE OF ROBOTIC COLLECTIVE CONSCIOUSNESS



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This Robot Manipulates Objects and Shares What It Learns With the Hive Mind

Newsweek

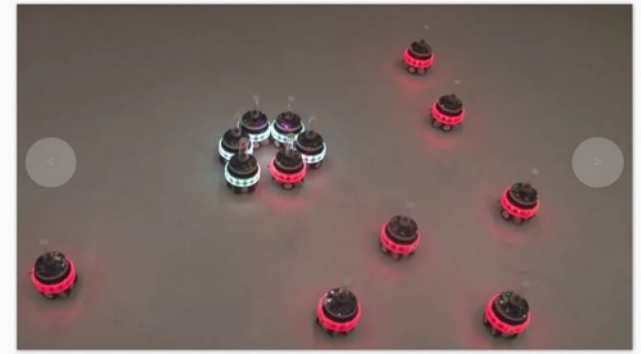
Tiny Linking Robots Share a Central Hive Mind With Each Other

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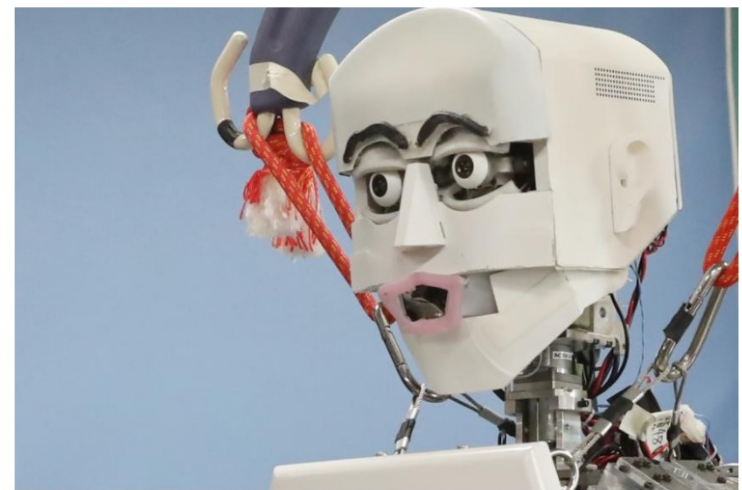


Science Science News Matthew Loffhagen Tuesday, 12 September 2017 - 7:27PM

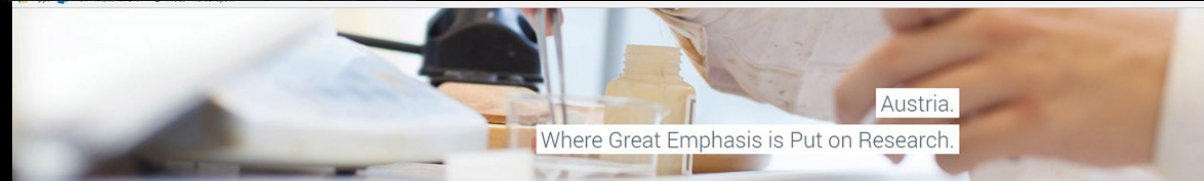


CAN MACHINES BE CONSCIOUS? SCIENTISTS SAY ROBOTS CAN BE SELF-AWARE, JUST LIKE HUMANS

BY ANTHONY CUTHBERTSON ON 11/4/17 AT 6:29 AM



A humanoid robot at the Research Institute for Science and Engineering at Waseda University's Kikucho campus in Tokyo on July 20.



Austria.

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Swarm of robots with a collective consciousness

15.06.2015

A scientific research project funded by the EU has led to the development of underwater swarms of robots which function similarly to schools of fish. According to information supplied by the project coordinator, Associate Professor Thomas Schmickl of the Institute for Zoology at Karl Franzens University Graz, the swarms of robots boast a collective consciousness.

The robots work as a collective system of autonomous robots which can learn from past experiences and their environment. The swarm of robots exchange information in order to monitor the environment, and can look for things, carry out repairs and explore and extract resources in underwater habitats. The EU-funded project called Collective Cognitive Robots (COCORO) carried out research and developed a collective consciousness of autonomous robots on the basis of ten different test demonstrators.

f t

<https://youtu.be/G1t4M2XnIhI>

ROBOTS AND HIVE MIND

Tiny Linking Robots Share a Central Hive Mind With Each Other

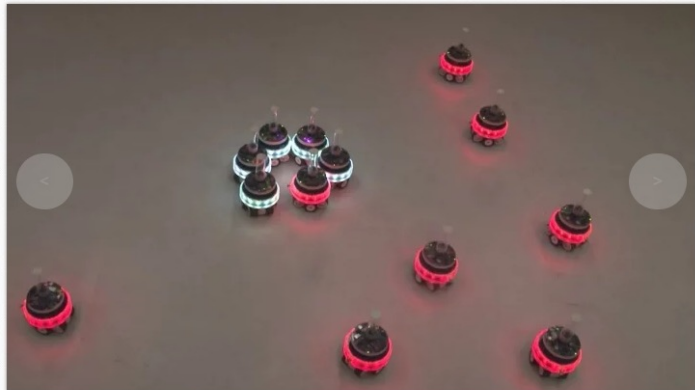
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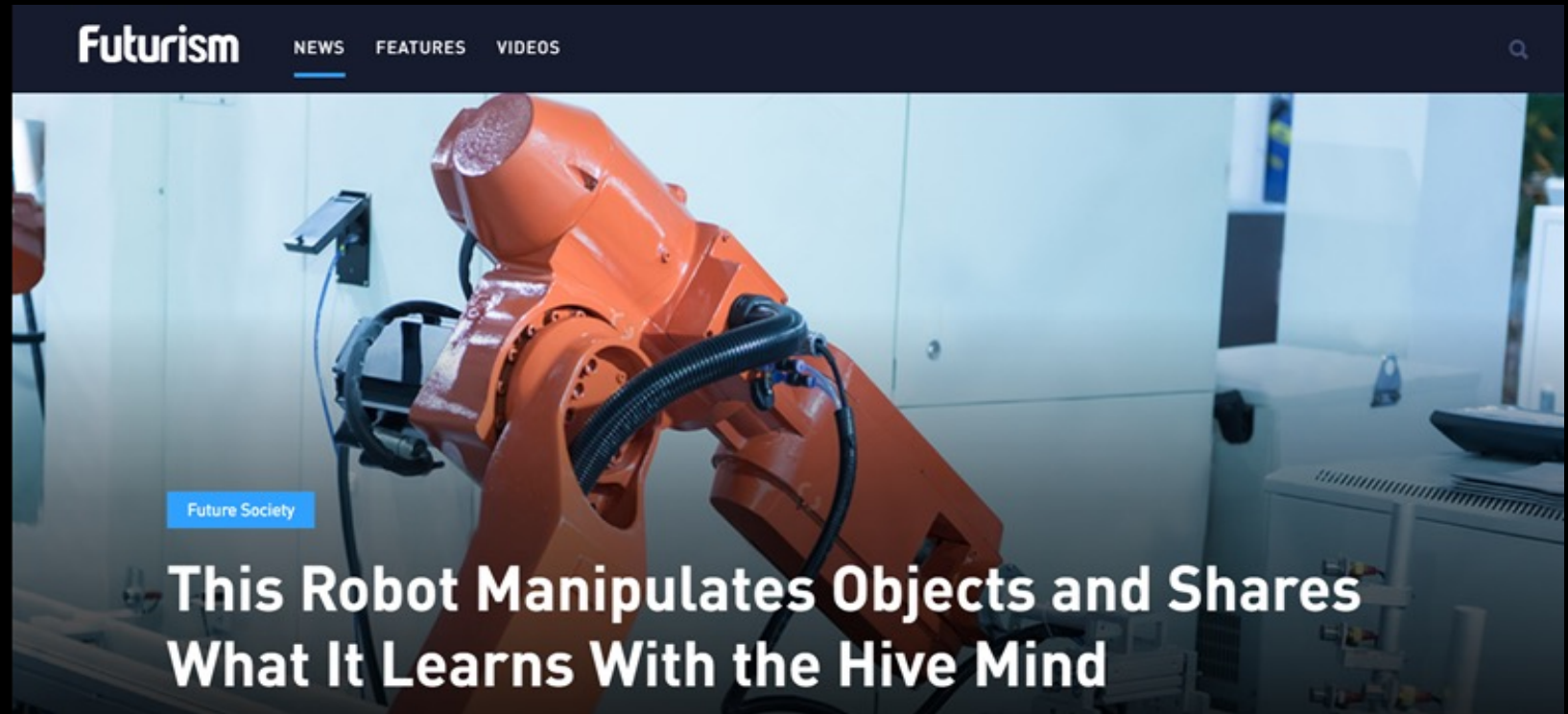
Robots can interact, cooperate, learn, repair, discard each other, self heal.

Our control paradigm enables robots to exhibit properties that go beyond those of any existing machine **or of any biological organism**: the robots we present can merge to form larger bodies with a single centralized controller, split into separate bodies with independent controllers, and self-heal by removing or replacing malfunctioning body parts. This work takes us closer to robots that can **autonomously change their size, form and function**.

Matthews et al (2017) Nature Communications 8: 439

<https://www.youtube.com/watch?v=kYsjLyFl9gc#action=share>

RIGHT HAND ROBOT

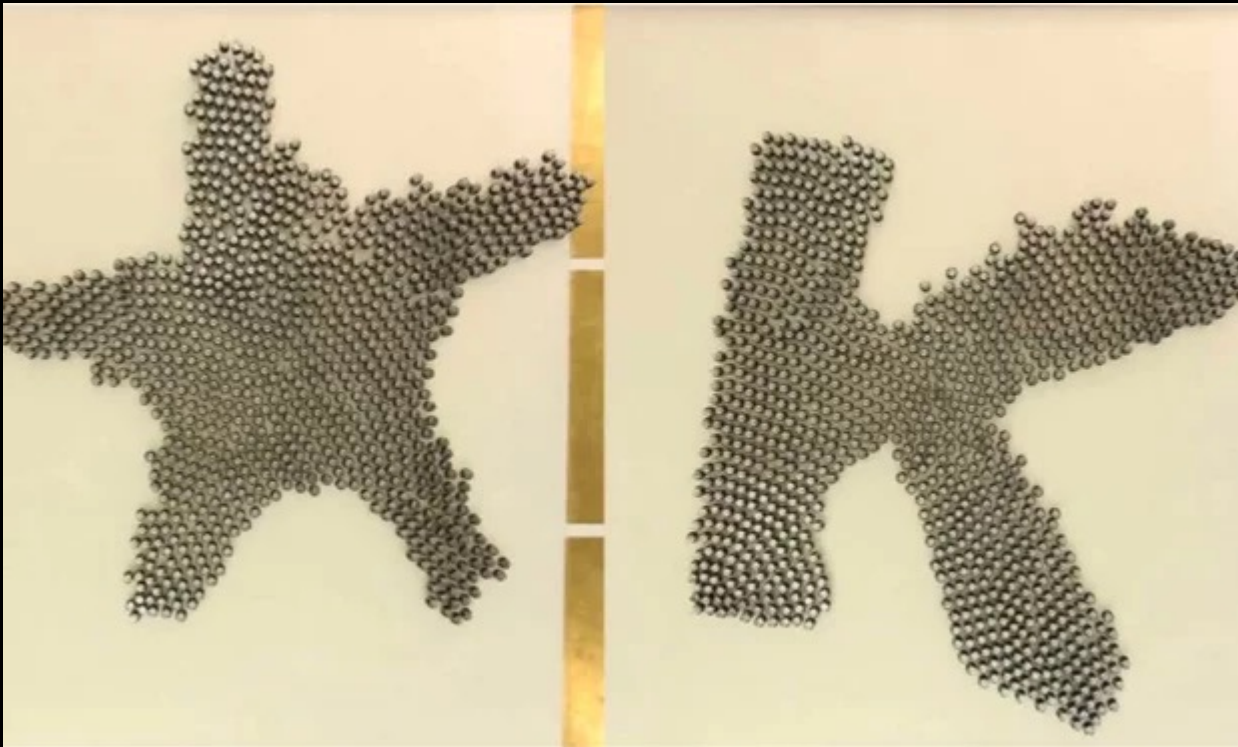


COLLECTIVE COGNITIVE ROBOTS (COCORO)



The EU-funded project called Collective Cognitive Robots (COCORO) carried out research and developed a collective consciousness of autonomous robots on the basis of ten different test demonstrators.

KILOBOTS SWARM



Harvard's new Kilobots swarm and cooperate in a 1,000-strong mass to create complex shapes with no micromanagement. Photograph: Harvard

ALLEN INSTITUTE FOR ARTIFICIAL INTELLIGENCE

The screenshot shows the homepage of the Allen Institute for Artificial Intelligence. At the top left is the logo, which consists of the letters 'AI2' in a stylized blue font, followed by the text 'ALLEN INSTITUTE for ARTIFICIAL INTELLIGENCE'. To the right of the logo is a navigation menu with the following items: 'Home', 'About', 'Programs', 'Projects', 'Careers', 'Research', and 'Press', each with a small downward arrow. A search icon is located to the right of the 'Press' link. The main content area features a large, light blue circular graphic with a white background. Inside this circle, the text reads: 'AI for the Common Good.' in a large, bold, blue font, followed by 'Our mission is to contribute to humanity through high-impact AI research and engineering.' in a smaller, black font. The background of the page is a collage of images, including a man in a light purple shirt smiling, a woman pointing at a whiteboard with mathematical equations, and various abstract geometric patterns. At the bottom of the page, there are several blue circular icons representing different aspects of the institute's work.

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AI for the Common Good.

Our mission is to contribute to humanity through high-impact AI research and engineering.

ROBOTIC COLLECTIVE CONSCIOUSNESS

**“Although centuries of philosophical dualism have led us to consider consciousness as unreducible to physical interactions, the empirical evidence is compatible with the possibility that consciousness arises from nothing more than specific computations.”
(Dehaene et al 2017)**

Or is it possible to say we have different understanding of consciousness and have to think about robotic consciousness in different terms?

Can sociology help us to make sense of robotic collective consciousness?

- Dehaene, S. Lau H., Koudier, S. 2017 What is consciousness, and could machines have it? *Science* 27: 492

COLLECTIVE CONSCIOUSNESS

- “the **totality of beliefs and sentiments** common to the average citizens of the same society **forms a determinate system which has its own life**; one may call it the collective or common conscience....It is, thus, an entirely different things from particular consciences, although **it can be realized only through them**” (The Division of Labour in Society, 1893/ 1984: 39).
- ‘Collective consciousness’ (CC) occurs throughout a given society because of their shared understandings, beliefs, and sentiments
- Durkheim believed that primitive societies had a stronger CC. Can this be the same in robots?
- CC is an external condition- it is independent and capable of determining social facts and it outlasts individuals. Can it be programmed?
- But it can only be realized only through the individuals
- **Maybe it is possible to talk about collective consciousness of a swarm of robots working together on a project.**

CRIME

Let's take crime:

“It is thus [the opposition that exists between crime of any kind and certain collective sentiments] which, far from deriving from the crime, constitutes the crime. In other words, we should not say that an act offends the collective consciousness because it is criminal, but that it is criminal **because it offends that consciousness**” (1984: 40).”

Crime is defined in terms of an **offense to the common consciousness.**

Earlier we saw that swarm robots can identify and discard the damaged robot.

Or they can repair, or self repair (as in ‘sickness’)

SOLIDARITY

- Mechanic solidarity is in primitive societies: automatic binding around shared values (eg religious symbols, beliefs, and rituals)
- Organic solidarity: division of labour and mutual reliance of individuals (eg religion and social institutions, media, state, education, marriage, police, law)
- Social harmony derives from the division of labor.
- Mechanic solidarity in robots?

SOCIAL CURRENTS

- Social currents: 'the great waves of enthusiasm, indignation, and pity' that are produced in public gatherings.
- These cannot be reduced to individuals and has a coercive power on us. We become aware of it only when we struggle against the common feelings
- Social currents can affect strongest institutions. For example social currents created in rock concerts were seen as a threat by Eastern European communist government (Ramet 1991)

SOCIAL CURRENTS

- Social currents are set of meanings that are shared by the members of a collectivity but they are not as strong as social institutions
- They cannot be explained in terms of the mind of any given individual
- Individuals can contribute to social currents through their interactions with each other
- Social currents exist at the level of interactions, not at the level of individuals
- Is it possible to see social current as algorithms?

HIVE MIND

- By collective consciousness, solidarity and social currents did Durkheim suggest that there are independent social currents 'coursing' through the social world as if they were suspended in a social void? (Ritzer and Goodman 2003)
- Is he according nonmaterial social facts and autonomous existence, separate from actors?
- Is he suggesting that we have a GROUP/HIVE MIND?

HIVE MIND

- There are very strong similarities between Durkheim's theory of social facts and current theories about brain and the mind (Ritzer and Goodman 2003) .
- Both theories used the idea that complex, constantly changing systems will begin to display new properties that 'cannot be predicted from a full and complete description of the component units of the system' (Sawyer, 2002: 228) and,
- that the complexity and intensity of interactions between individuals cause a new level of reality to emerge that cannot be explained in terms of individuals.

CONCLUSION

“The best reason for believing that robots might some day become conscious is that we human beings are conscious, and **we are a sort of robot ourselves**. That is, **we are extraordinarily complex self-controlling, self-sustaining physical mechanisms, designed over the eons by natural selection, and operating according to the same well-understood principles** that govern all the other physical processes in living things: digestive and metabolic processes, self-repair and reproductive processes, for instance. It may be wildly over-ambitious to suppose that human artificers can repeat Nature's triumph, with variations in material, form, and design process, but this is not a deep objection. ”

- Dennett, D. C. (1994) . Consciousness in Human and Robot Minds. IAS Symposium on Cognition, Computation and Consciousness.1:3